

WHAT IS CLAIMED IS:

1. A medical probe device comprising:
an ultrasound transducer housing comprising an ultrasound transducer and a base, the ultrasound transducer housing defining a probe guide opening through the base; and
a sterile seal comprising a sterile probe guide, wherein the sterile probe guide is removably attachable to the ultrasound transducer housing, and wherein upon attachment of the sterile probe guide to the ultrasound transducer housing, the sterile probe guide is received into the probe guide opening.
2. The medical probe device of claim 1, wherein the sterile seal further comprises a sterile sleeve which is adapted for substantially covering the exterior of the ultrasound transducer housing without blocking motion of a probe in the sterile probe guide.
3. The medical probe device of claim 2, wherein the sterile sleeve comprises a pliant material.
4. The medical probe device of claim 2, wherein the sterile sleeve comprises a formed thermoplastic material.
5. The medical probe device of claim 1, wherein the medical probe device is a linear, noninvasive medical probe device comprising a linear ultrasound transducer.
6. The medical probe device of claim 5, wherein the probe guide opening is perpendicular to the base of the ultrasound transducer housing.
7. The medical probe device of claim 1, wherein the medical probe device is a noninvasive medical probe device comprising an ultrasound transducer defining an arcuate profile.
8. The medical probe device of claim 7, wherein the probe guide opening is perpendicular to the tangent of the base at the probe guide opening.
9. The medical probe device of claim 1, further comprising a clamp for clamping a probe in the probe guide opening.

10. The medical probe device of claim 1, further comprising a monitor, wherein the ultrasound transducer is connected to the monitor for displaying a sonogram.

11. The medical probe device of claim 10, wherein the path of a probe guided through the sterile probe guide defines a line that is parallel to the plane of the sonogram.

12. The medical probe device of claim 10, further comprising a detector for detecting motion of a probe in the sterile probe guide, the detector being in communication with a processing unit for displaying information concerning the motion of a probe in the sterile probe guide.

13. The medical probe device of claim 12, wherein the information is displayed as an image of a virtual probe on the monitor.

14. A medical probe device comprising:
an ultrasound transducer housing comprising an ultrasound transducer for transmitting an ultrasonic beam in a field and for receiving reflections of the ultrasonic beam, the ultrasound transducer generating an output signal in response to the received reflections, the ultrasound transducer housing defining a probe guide opening for guiding a probe on a path in the field; and
a monitor, the monitor being in communication with the ultrasound transducer, the monitor being configured to display a sonogram based on the output signal from the transducer and being further configured to display information concerning the path of a probe in the field.

15. The medical probe device of claim 14, wherein the path is parallel to the plane of the sonogram.

16. The medical probe device of claim 14, further comprising a detector for detecting motion of a probe in the probe guide opening, the detector generating an output signal in response to the detected motion.

17. The medical probe device of claim 14, wherein information carried by the output signal from the detector is displayed on the monitor in the form of a virtual image of the probe.

18. The medical probe device of claim 14, further comprising a sterile seal comprising a sterile probe guide that is removably receivable within the probe guide opening.

19. The medical probe device of claim 18, the sterile seal further comprising a sterile sleeve continuous from the sterile probe guide, the sterile sleeve being configured to substantially enclose the ultrasound transducer housing without blocking motion of a probe through the sterile probe guide.

20. The medical probe device of claim 14, further comprising a clamp for securing a probe in the probe guide opening.

21. The medical probe device of claim 14, wherein the medical probe device is for use in a central venous catheterization process.

22. A medical probe device comprising:
an ultrasound transducer housing comprising a base and an ultrasound transducer for transmitting an ultrasonic beam, the ultrasound transducer housing defining a probe guide opening through the base; and
a mechanical clamp in communication with the ultrasound transducer housing for securing a probe in the probe guide opening.

23. The medical probe of claim 22 further comprising a probe guide which is removably receivable in the probe guide opening.

24. The medical probe device of claim 22, wherein the medical probe device is a linear, noninvasive medical probe device comprising a linear ultrasound transducer.

25. The medical probe device of claim 24, wherein the probe guide opening is perpendicular to the base of the ultrasound transducer housing.

26. The medical probe device of claim 22, wherein the medical probe device is a noninvasive medical probe device and the base defines an arcuate profile.

27. The medical probe device of claim 26, wherein the probe guide opening is perpendicular to the tangent of the base at the probe guide opening.

28. A sterile seal comprising a sterile probe guide, wherein the sterile probe guide is removably attachable within a probe guide opening defined by an ultrasound transducer housing to provide a sterile barrier between a probe in the sterile probe guide and the ultrasound transducer housing.

29. The sterile seal of claim 28, the sterile seal further comprising a sterile sleeve continuous from one end of the sterile probe guide, the sterile sleeve being adapted for substantially covering the exterior of the ultrasound transducer housing without blocking motion of a probe through the sterile probe guide when the sterile probe guide is attached within the probe guide opening.

30. The sterile seal of claim 29, wherein the sterile sleeve comprises a pliant material.

31. The sterile seal of claim 29, wherein the sterile sleeve comprises a base, adapted to conform to the base of an ultrasound transducer housing when the sterile probe guide is attached within the probe guide opening defined by the ultrasound transducer housing.

32. The sterile seal of claim 28, further comprising a clamp for securing a probe in the sterile probe guide.

33. The sterile seal of claim 28, wherein the sterile probe guide comprises separable top and bottom portions.

34. A medical probe device comprising:
an ultrasound transducer housing comprising a base and an ultrasound transducer comprising an arcuate array of elements for forming a sonogram, the ultrasound transducer housing defining a probe guide opening through the base and the ultrasound transducer.

35. The medical probe device of claim 34, in which the ultrasound transducer comprises an array of individual elements, the probe guide opening passing through the array of elements at a break in the array.

36. The medical probe device of claim 34, in which the probe guide opening passes through the ultrasound transducer within the area defined by the ultrasound transducer.

37. The medical probe device of claim 34, in which the probe guide opening is perpendicular to a tangent of the base at the probe guide opening.

38. A medical probe device comprising:

an ultrasound transducer housing comprising an ultrasound transducer and a base, the ultrasound transducer housing defining a probe guide opening, wherein the probe guide opening passes through the base and passes through the ultrasound transducer housing outside of the area defined by the ultrasound transducer, wherein a probe guided through the probe guide opening travels on a path parallel to the plane of a sonogram formed by the ultrasound transducer.

39. The medical probe device of claim 38, wherein the probe guide opening is perpendicular to the base of the ultrasound transducer housing.

40. The medical probe device of claim 38, wherein the ultrasound transducer is a linear ultrasound transducer.

41. The medical probe device of claim 38, wherein the ultrasound transducer defines an arcuate profile.

42. A method for guiding a percutaneous probe to an internal target comprising:

providing an ultrasound transducer housing comprising an ultrasound transducer for transmitting an ultrasonic beam and receiving reflections of the ultrasonic beam, the ultrasound transducer housing defining a probe guide opening therethrough;

providing a removably attachable sterile seal, the sterile seal comprising a sterile probe guide;

receiving the sterile probe guide within the probe guide opening; and
guiding a probe through the sterile probe guide to a percutaneous target.

43. The method of claim 42, further comprising forming a sonogram of the percutaneous target on a monitor in response to the reflections of the ultrasonic beam.

44. The method of claim 43, wherein the path of the probe guided through the sterile probe guide defines a line that is parallel to the plane of the sonogram.

45. The method of claim 44, wherein the path is shown on the sonogram.

46. The method of claim 43, further comprising:
creating a data stream in response to motion of the probe in the probe guide; and
forming a real time image of information contained in the data stream.

47. The method of claim 46, wherein the real time image is an image of a virtual probe overlayed on the sonogram.

48. The method of claim 42, further comprising:
contacting the percutaneous target with the probe; and
clamping the probe in the probe guide.

49. The method of claim 42, wherein the percutaneous target is the lumen of a blood vessel.

50. The method of claim 42, wherein the method is carried out by a single operator.

51. A method of guiding a probe to a target comprising:
providing an ultrasound transducer housing comprising an ultrasound transducer for transmitting an ultrasonic beam and receiving reflections of the ultrasonic beam, the ultrasound transducer housing defining a probe guide opening therethrough at a known angular relationship to a base of the ultrasound transducer housing;

guiding a probe through the probe guide opening toward a target on a path defined according to the known angular relationship;

forming a sonogram in response to the reflections received by the ultrasound transducer; and

forming an image of the path on the sonogram.

52. A method of guiding a probe to a target comprising:
providing an ultrasound transducer housing comprising an ultrasound transducer for transmitting an ultrasonic beam in a field and receiving reflections of

the ultrasonic beam, the ultrasound transducer housing defining a probe guide opening therethrough;

guiding a probe through the probe guide opening and into the field of the ultrasonic beam;

forming a sonogram in response to the reflections received by the ultrasound transducer;

detecting the motion of the probe in the probe guide opening;

creating a data stream in response to the detected motion;

forming an image of the probe in the field on the sonogram from the information contained in the data stream.

53. The method of claim 52, wherein the motion of the probe in the probe guide defines a line that is parallel to the plane of the sonogram.

54. The method of claim 52, further comprising:

contacting the target with the end of the probe; and

clamping the probe in the probe guide.

55. A method of guiding a probe to a target comprising:

providing an ultrasound transducer housing comprising an ultrasound transducer for transmitting an ultrasonic beam from an array of elements and receiving reflections of the ultrasonic beam, the ultrasound transducer housing defining a probe guide opening therethrough;

guiding a probe through the probe guide opening toward a target;

contacting the target with the end of the probe; and

mechanically clamping the probe in the probe guide.